

DATE: October 1, 2003

TO: Basis of Estimate Handbook Users

FROM: David Duncan, CES Coordinator

E-COPY: Ken Morefield, Freddie Simmons, Bill Albaugh, Robert Greer, Phillip “Greg” Davis, William Nickas, Duane Brautigam, Brian Blanchard, Sharon Holmes, Ananth Prasad, Bruce Dietrich, District Design Engineers, District Project Management Engineers, District Structures Design Engineers, District Construction Engineers, District Pavement Design Engineers, and District Specifications Engineers

SUBJECT: **2004 Basis of Estimate Handbook
Electronic Edition - Summary of Major Changes**

The Coordination Team made recommendations for the implementation of changes to pay items and specifications that have been developed within the last six months. The implementation plan for each issue has been approved by the appropriate office and concurred to by the Directors of both the Office of Design, and Highway Operations. A detailed description of each of these changes and their implementation date is attached. The following is a summary of issues addressed in this update:

Group	Issue Description	Effective Letting	Page No.
Estimates	Project Header and Structures Category	Immediately	3 - 4
Structures	Hilfiker Retaining Wall Systems	Immediately	5 - 6
Roadway	Vehicular Impact Attenuator/Crash Cushion (Gating) (Temporary)	July 2004	7 - 8
Construction	Value Added Pavements	January 2004	9 - 10
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Roadway	Patterned/Textured Pavement	July 2004	13 - 14
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General Notices:

Design Update Training

Design update training will be offered this fall at various locations around the state. The Roadway Design Office web page at <http://www.dot.state.fl.us/rddesign/training/training.htm> has detailed information.

BOE Online

BOE handbook is published on line at <http://www.dot.state.fl.us/estimates> Please register on-line to be notified via e-mail when the Basis of Estimate Handbook is updated.

Pay Item Year 00

The Pay Item file for TRNS*PORT PES/CES and Designer Web pages will remain as Year 00. In the past, the pay item structure would periodically be “overhauled” and implemented in conjunction with a new Specifications book. Since the pay item structure is not related to the publication of the 2004 specification book, and there have been no such modifications of the structure this year, there is no need to implement a new pay item list at this time. Users should continue to load pay items with Pay Item Year 00.

FDOT’s web address

The Department has begun transitioning back to the www.dot.state.fl.us web address. The various offices within FDOT will be updating their web pages, handbooks, manuals, and other online materials. Both addresses will work throughout the transition period. Upon completion, the www11.MyFlorida.com web address for FDOT will be disabled.

Please update your bookmarks and/or favorites to link to the www.dot.state.fl.us address.

CES Mainframe System: “AKBAR”

The mainframe AKBAR system will be disabled December 31, 2003. All pay item related searches should now be completed through the TRNS*PORT Designer Web pages and/or TRNS*PORT PES/CES.

To request access to the TRNS*PORT system, you must first have a valid FDOT userID. (Consultants should contact their FDOT Project Manager for information and form.) After obtaining a userID, contact your District Estimates Office for access to the TRNS*PORT web pages. Additional information is available on the Estimates Office web pages at www.dot.state.fl.us/estimates.

Effective Immediately

Project Header and Structures Category- Loading TRNS*PORT information

History: Information within TRNS*PORT is supplied by several sources: FM, Consultants, and other FDOT systems. When adding or updating TRNS*PORT information, it is important to know that the most recent information is being used. Your assistance with the following QA/QC checks will ensure that we have accurate information to supply future search requests by you and upper management.

This information is also used to provide reports required by FHWA. Accurate information is necessary to ensure future federal funding.

Project Header: When loading a project, verify that the project header information is correct. If an error is found, contact the Project Manager immediately, who will coordinate the FM data update. DO NOT update the TRNS*PORT project header, as the information will be refreshed nightly from FM.

Of particular concern, verify that the project work mix is coded correctly: bridge widening should not be coded as new construction.

Structures Category (TRNS*PORT *): The structures header contains bridge type, length, width, and other critical information. Please ensure that the bridge type, dimensions, and structures work type are coded correctly. ** Not to be confused with category 1 and 2 as defined in the Structures Design Guidelines.*

Of particular concern, verify that bridge widths for “bridge widening” include only the widened dimension, not the new total width.

Implementation Plan:

Designers: Contact the FDOT Project Manager to report any discrepancies between the project data and FM data. Update the TRNS*PORT Structures Category as necessary.

Project Managers: Ensure that the FM system is updated with current information.

Contact Person: District TRNS*PORT Coordinator

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Effective Immediately

Issue: Hilfiker Retaining Wall Systems

History: Retaining walls meeting the requirements of Design Standards 5021 and 5120 were supplied by a partnership of Hilfiker and T&B Engineering. We have been advised that this partnership has been dissolved and there is a disagreement between the two companies in the validity or ownership of the patents. Effective immediately, Design Standards 5021 and 5120 have been voided and are not to be included in any projects yet to be bid. Do not list any Hilfiker or T&B wall systems in the list of applicable walls shown in the plans. Neither company has a valid standard that has been approved by the Department for use. Directions for use on projects that are currently under construction will be forthcoming shortly.

There are no changes in quantities or pay items associated with this item. Pay item 548-XAA remains valid for other wall systems.

Implementation Plan:

Central Office Design: Letters have already been sent by the SDO to the vendors explaining the situation and notifying them the standards are void.

District Design: Update plans to remove any mention of the wall systems supplied by either of these two companies. This applies to all lettings effective October 2003.

Specifications: A specification is currently being written to void Design Standard 5021 and 5120 and the specification will be placed in all projects.

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the July 2004 Letting

Issue: *Vehicular Impact Attenuator/Crash Cushion (Gating) (Temporary)*

History: The department has decided to pay for sand barrels as a complete array, per location, instead of per barrel. This change allows the contractor to select a gating crash cushion of his choosing at each location subject to the uses and limitations identified in the Design Standards. If during the design process, it is determined that a specific proprietary crash cushion must be used at a particular location, this information should be identified in the plans by using a pay item note.

Note: For all Vehicular Impact Attenuators, we are transitioning the name to Crash Cushion. Crash Cushion is the national term used to identify these devices.

Implementation Plan:

Central Office Design:

Establish the following new pay items October 2003:

102- 81- 2	Vehicular Impact Attenuator/Crash Cushion (Gating) (Temp)	LO
2102- 81- 2	<i>Vehicular Impact Attenuator/Crash Cushion (Gating) (Temp)</i>	<i>LO</i>

Permanently block the following pay items June 30, 2004:

102- 81- 1	Vehicular Impact Attenuator Modules (Inertia) (Temporary)	EA
2102- 81- 1	<i>Vehicular Impact Attenuator Modules (Inertia) (Temporary)</i>	<i>EA</i>

District Design: Update plans and TRNS*PORT files on applicable projects beginning with the July 2004 letting.

Specifications: Specifications are being modified and will be available for the July 2004 letting.

Contact Person - Cheryl Adams 850-414-4327 SC 994-4327

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2004 Letting

***Issue: Value Added Pavements
Asphalt and Portland Cement Concrete***

History: Continuing the Department's efforts in Contractor Quality Control and Contractor accountability for their work, the Department has developed Value Added specifications for Asphalt and Portland Cement Concrete pavements based on key performance indicators. The value added by the specifications is the addition of a warranty period for which the Contractor is responsible for the pavement performance.

Implementation Plan:

Central Office Design

No additional pay items are necessary with Specification 338 and 355; payment is incidental to the cost of the pavement.

Permanently block the following pay items December 31, 2003:

338-3	Warranted Asphalt Pavement	TN
2338-3	<i>Warranted Asphalt Pavement</i>	<i>MT</i>
903-355-1AA	Guaranteed Portland Cement Concrete Pavement	SY
2903-355-1AA	<i>Guaranteed Portland Cement Concrete Pavement</i>	<i>M2</i>

Specifications: Specifications will be available for the January 2004 letting. **Reminder:** Use of the 338 or 355 specifications also requires use of the Statewide Disputes Review Board Specifications.

Contact Person: David Sadler 850-414-5203 SC 994-5203

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved: Bruce Dietrich _____ Date _____
State Pavement Design Engineer

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the July 2004 Letting

Issue: U-Endwalls

History: Previously, some U-endwalls were paid for per each and others were paid for as concrete and steel. To eliminate confusion, indexes 260 and 261 were updated to pay for all U-endwalls as per each. Please note that endwalls detailed under Index 250 will continue to be paid for under concrete and steel items.

Implementation Plan:

Central Office Design:

Establish the following new pay items March 2003:

430-6AB-CDD	U-Endwall	EA
2430-6AB-CDD	<i>U-Endwall</i>	<i>EA</i>

a= Index Number
0 (Standard 260) When a=0, b=2 and c=1
1(Standard 261)

b= Appurtenance(s)
0 (None)
1 (Baffles)
2 (Grate)
3 (Baffles and Grate)

c= Slope
0 (1:6)
1 (1:4)
2 (1:3)

dd= Standard Pipe Size
21 (300mm)
23 (15") 23 (375mm)
25 (18") 25 (450mm)
27 (525mm)
29 (24") 29 (600mm)
31 (675mm)
33 (30") 33 (750mm)
38 (900mm)

Permanently block the following pay items June 30, 2004:

430-610-XAA	U-Endwall With Grate	EA
2430-610-XAA	<i>U-Endwall With Grate</i>	<i>EA</i>
460-5	Endwall Grate	LB
2430-5	<i>Endwall Grate</i>	<i>KG</i>

District Design: Update Trns-port files and plans to indicate the use of the new pay item and standards on appropriate projects beginning with the July 2004 letting.

Specifications: Specifications will be available for the July 2004 letting.

Contact Person - Jerome Taylor 850-414-4355 SC 994-4355

Approved: Rick Renna _____ Date _____
State Drainage Engineer

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved: Phillip "Greg" Davis _____ Date _____
State Estimates Engineer

Approved: Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective July 2004 letting

Issue: *Patterned/Textured Pavement*

History: The Coordination Team has created a new pay item and Specification for Patterned and Textured Pavement. This specification includes coloring, stamping, texturing, coating, and other treatments to asphalt and concrete surfaces. It was developed with the cooperation of several industry representatives, and does not restrict the contractor to a particular product or process.

Payment under this specification is for the treatment and materials of the patterned /textured surface. The underlying material (asphalt or concrete) is paid separately. The plans must indicate the color, pattern, and/or texture required, but not the product or process. Refer to the specification for details.

Implementation Plan:

Central Office Design

The PPM will be updated to provide additional guidance to designers.

Establish the following new pay items September 2003:

523- 1-xxa	Patterned/Textured Pavement	SY
2523- 1-xxa	<i>Patterned/Textured Pavement</i>	M2

Permanently block the following pay items June 30, 2004:

523- 70-	Coloring Concrete Surfaces	SY
2523- 70-	<i>Coloring Concrete Surfaces</i>	M2
526- 71-	Pavement Texturizing	SY
2526- 71-	<i>Pavement Texturizing</i>	M2

District Design: Update the plans and TRNS*PORT files on applicable projects, beginning with the July 2004 letting.

Specifications: Specification will be available for the July 2004 letting.

Contact Person: Melissa Hollis 850-414-4182 SC 994-4182

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Issue: *Fencing*

History: The Department has decided to revise the method of calculation and payment for fencing items. The calculation of corner and pull posts will no longer be required. The cost for pull and corner post assemblies will now be included in the payment of fencing. Gates will be grouped by opening size range.

Implementation Plan:

Central Office Design:

Establish the following new pay items September 2003:

550-10-ABC	Fencing	LF
2550-10-ABC	<i>Fencing</i>	<i>MI</i>

- a = Fence Type
 1 (Type A)
 2 (Type B)
 3 (Type R- Full Enclosure)
 4 (Type R- Partial Enclosure)
 9 (Special)
- b = Fabric/Material Height
 1 (0.0- 5.0' Height) Note: Type A Standard
 2 (5.1- 6.0' Height) Note: Type B Standard
 3 (6.1- 7.0' Height)
 4 (7.1- 8.0' Height)
 5 (8.1-10.0' Height)
- 1 (0.0- 1.5m Height) Note: Type A Standard*
 2 (1.6- 1.8m Height) Note: Type B Standard
 3 (1.9- 2.1m Height)
 4 (2.2- 2.4m Height)
 5 2.5- 3.1m Height)
- c = Details/Features
 0 (Standard)
 1 (w/Barbed Wire Attmt)(Type B Only)
 2 (w/Vinyl Coating)(Type B Only)
 3 (Full Enclosure)(Type R Only)
 4 (Partial Enclosure)(Type R Only)
 8 (Reset Existing)
 9 (Special)

550-60-ABC	Gates	EA
2550-60-ABC	<i>Gates</i>	<i>EA</i>
a =	Fence Type	
	1 (Type A)	
	2 (Type B)	
	9 (Special)	
b =	Gate Type	
	1 (Single)	
	2 (Double)	
	3 (Sliding / Cantilever)	
c =	Size of Opening	
	1 (0-6.0' Opening)	(0-2.0m Opening)
	2 (6.1-12.0' Opening)	(2.1- 4.0m Opening)
	3 (12.1-18.0' Opening)	(4.1- 6.0m Opening)
	4 (18.1-20.0' Opening)	(6.1- 7.0m Opening)
	5 (20.1-24.0' Opening)	(7.1- 8.0m Opening)
	6 (24.1-30.0' Opening)	(8.1- 10.0m Opening)
	7 (Greater than 30' Opening)	(Greater than 10.0m Opening)

Permanently block the following pay items June 30, 2004:

550-1-XXA	Fencing, Type A	LF
2550-1-XXA	<i>Fencing, Type A</i>	<i>MI</i>
550-2-XXA	Fencing, Type B	LF
2550-2-XXA	<i>Fencing, Type B</i>	<i>MI</i>
550-3-XXA	Fence Corner Post Assembly	EA
2550-3-XXA	<i>Fence Corner Post Assembly</i>	<i>EA</i>
550-4-XXA	Fence Pull & End Post Assembly	EA
2550-4-XXA	<i>Fence Pull & End Post Assembly</i>	<i>EA</i>
550-5-XXA	Pull Post Assembly (Type B Fence)	EA
2550-5-XXA	<i>Pull Post Assembly (Type B Fence)</i>	<i>EA</i>
550-6-XXA	End Post Assembly (Type B Fence)	EA
2550-6-XXA	<i>End Post Assembly (Type B Fence)</i>	<i>EA</i>
550-71-XXA	Fencing, Type R (Pedestrian Overpass)	LF
2550-71-XXA	<i>Fencing, Type R (Pedestrian Overpass)</i>	<i>MI</i>

550-73-XXA	Fencing, Special	LF
2550-73-XXA	<i>Fencing, Special</i>	<i>MI</i>
550-74-XXA	Fencing, Reset Existing	LF
2550-74-XXA	<i>Fencing, Reset Existing</i>	<i>MI</i>
550-75-XXA	Fence Gate, Type A	EA
2550-75-XXA	<i>Fence Gate, Type A</i>	<i>EA</i>
550-76-AAB	Fence Gate, Type B	EA
2550-76-AAB	<i>Fence Gate, Type B</i>	<i>EA</i>
550-79-XAA	Sliding Gate, (Cantilever)	EA
2550-79-XAA	<i>Sliding Gate, (Cantilever)</i>	<i>EA</i>

District Design: Update the plans and TRNS*PORT files on applicable projects, beginning with the July 2004 letting.

Specifications: Specification will be available for the July 2004 letting.

Contact Person: Chester Henson 850-414-4117 SC 994-4117

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2004 Letting

Issue: Landscape Installation

History: Continuing the Department's efforts in Contractor Quality Control and Contractor accountability for their work, the Department has developed specifications for Landscape Installation that are less prescriptive and that include all associated work to be included in the cost of the plant. Additionally, the specifications require a warranty bond for the one-year establishment period for which the Contractor is responsible for the plant performance.

In accordance with this specification change, selected items that were previously paid separately are now incidental to the cost of the plant.

Implementation Plan:

Central Office Design

Permanently block the following pay items December 31, 2003:

579- 70-	Soil Sterilization Treatment	SY
2579- 70-	<i>Soil Sterilization Treatment</i>	<i>M2</i>
580-192	Coquina Rock Boulders	TN
2580-192	<i>Coquina Rock Boulders</i>	<i>MT</i>
580-278-xxa	Gravel and Stone	TN
2580-278-xxa	<i>Gravel and Stone</i>	<i>MT</i>
580-281-	Mowing Strip Concrete	LF
2580-281-	<i>Mowing Strip Concrete</i>	<i>MI</i>
580-301-xxa	Staking and Guying	EA
2580-301-xxa	<i>Staking and Guying</i>	<i>EA</i>
580-326-xxa	Mulch (Pine Bark/Cypress Bark/Wood Chips)	SY
2580-326-xxa	<i>Mulch (Pine Bark/Cypress Bark/Wood Chips)</i>	<i>M2</i>
580-327-4	Planting Only- Plant Material Provided By Others	EA
2580-327-4	<i>Planting Only- Plant Material Provided By Others</i>	<i>EA</i>
580-333-	Curb Landscape Steel	LF
2580-333-	<i>Curb Landscape Steel</i>	<i>MI</i>
580-342-	Monitoring Report	EA
2580-342-	<i>Monitoring Report</i>	<i>EA</i>

580-343-	Tree Spraying	EA
2580-343-	<i>Tree Spraying</i>	<i>EA</i>
580-400-	Wetland Monitoring Station	EA
2580-400-	<i>Wetland Monitoring Station</i>	<i>EA</i>
580-401-	Bench Mark	AS
2580-401-	<i>Bench Mark</i>	<i>EA</i>
580-402	Staff Gauge	AS
2580-402	<i>Staff Gauge</i>	<i>EA</i>

District Design: Update plans and TRNS*PORT files on applicable projects, beginning with the January 2004 letting. Remember to load 580 pay items under Category 0600.

Specifications: Specifications are available for the January 2004 letting. **Reminder:** Use of the 580 specifications also requires use of the Statewide Disputes Review Board Specifications

Contact Person: Jeff Caster 850-410-5892 SC 210-5892

Approved: Jeff Caster _____ Date _____
State Transportation Landscape Architect

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Phillip “Greg” Davis _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the July 2004 Letting

Issue: Landscape Installation

History: Following the specification change for Landscape Installation that is effective with the January 2004 lettings, a new pay item, Landscape Complete, has been divided into small plants and large plants, based on container/plant size. In accordance with this pay item change, selected items that were previously paid separately are now included in the new pay items. Refer to the latest edition of the Florida Grades and Standards for Nursery Plants to determine if a plant is classified as tree, palm, cycad, shrub, or ground cover. For B&B plants, select the new pay item for plants of the nearest equivalent dimensions.

All plant types (size, species, etc.) must be detailed on the plant schedule in the plans, in accordance with Volume 2, Chapter 26 of the PPM.

Implementation Plan:

Central Office Design

Establish the following new pay items September 2003:

580-xx1-xxa Landscape Complete LS
2580-xx1-xxa *Landscape Complete* LS

- a = 1 (Small plants)
 all ground covers
 shrubs to less than 7 gallon
 trees to less than 7 gallon
 palms clustering type less than 6 foot overall height (OH)
 cycads to less than 7 gallon
 2 (Large plants)
 shrubs 7 gallon or greater
 trees 7 gallon and greater
 all palms single trunk
 palms clustering type 6 foot overall height (OH) and greater
 cycads 7 gallon or greater
 all sabal palms (aka sabal palmetto, cabbage palm, state tree)

Permanently block the following pay items June 30, 2004:

580-173	Bed Preparation & Mulching	SY	
2580-173	<i>Bed Preparation & Mulching</i>	<i>SY</i>	
580-258	Rock Boulders	TN	
2580-258	<i>Rock Boulders</i>	<i>MT</i>	
580-327-xxa	Relocation of Small Trees, Shrubs, Ground Cover		EA
2580-327-xxa	<i>Relocation of Small Trees, Shrubs, Ground Cover</i>		<i>EA</i>
580-332-xxa	Tree Removal	EA	
2580-332-xxa	<i>Tree Removal</i>	<i>EA</i>	
580-334	Tree Planting Pit Cover	EA	
2580-334	<i>Tree Planting Pit Cover</i>	<i>EA</i>	
580-336	Pruning and Trimming (Existing Trees)	EA	
2580-336	<i>Pruning and Trimming (Existing Trees)</i>	<i>EA</i>	
580-340-xxa	Tree Protection	LF	
2580-340-xxa	<i>Tree Protection</i>	<i>MI</i>	
581-xxa	Ground Cover	PL	
2581-xxa	<i>Ground Cover</i>	<i>EA</i>	
582-xxa	Shrubs	PL	
2582-xxa	<i>Shrubs</i>	<i>EA</i>	
583-xxa	Trees	PL	
2583-xxa	<i>Trees</i>	<i>EA</i>	
584-xxa	Palms (Single Trunk)	PL	
2584-xxa	<i>Palms (Single Trunk)</i>	<i>EA</i>	
585-xxa	Palms (Clump Type)	PL	
2585-xxa	<i>Palms (Clump Type)</i>	<i>EA</i>	
589-1-	Landscape Establishment and Maintenance	LS	
2589-1-	<i>Landscape Establishment and Maintenance</i>	<i>LS</i>	

District Design: Update plans and TRNS*PORT files on applicable projects, beginning with the July 2004 letting. Remember to load 580 pay items under Category 0600.

Reminder: If there is a small amount of landscape work, the plant schedule may be shown in the Roadway plans, but pay items must be loaded under Category 0600 and shown in the "Summary of Landscape Pay Items."

Specifications: No specifications changes are required.

Contact Person: Jeff Caster 850-410-5892 SC 210-5892

Approved: Jeff Caster _____ Date _____
State Transportation Landscape Architect

Approved: Brian Blanchard _____ Date _____
State Roadway Design Engineer

Approved: Ananth Prasad _____ Date _____
State Construction Engineer

Approved Sharon Holmes _____ Date _____
State Maintenance Engineer

Approved: Phillip "Greg" Davis _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer